John Day Watershed Restoration Projects

Annual Report
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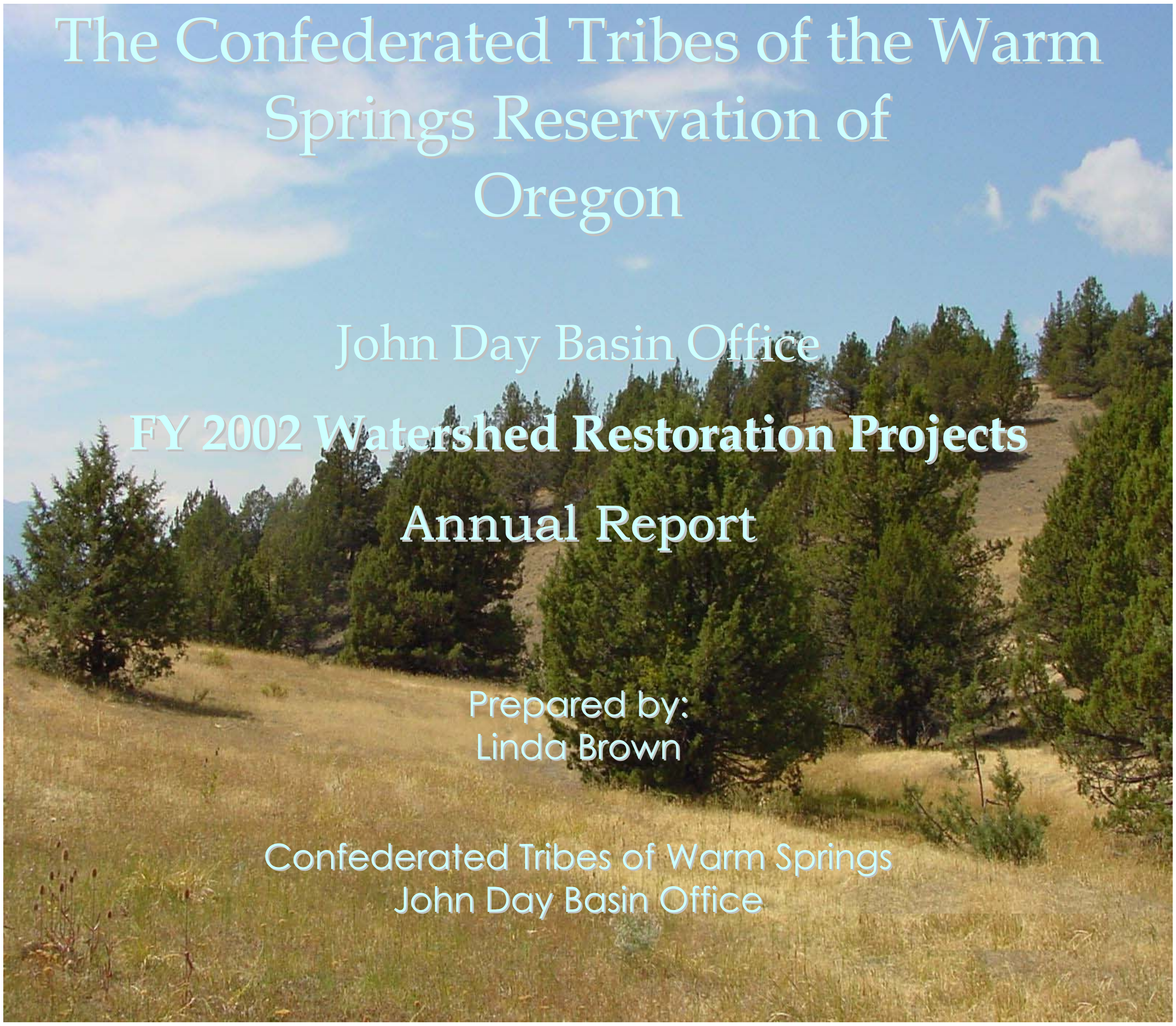

The Confederated Tribes of the Warm Springs Reservation of Oregon

John Day Basin Office

FY 2002 Watershed Restoration Projects

Annual Report

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Confederated Tribes of Warm Springs
John Day Basin Office

Prepared for:

U.S. Department of Energy
Bonneville Power Administration
Environment, Fish and Wildlife Division

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Abstract

The John Day is the nation's second longest free-flowing river in the contiguous United States and the longest containing entirely unsupplemented runs of anadromous fish. Located in eastern Oregon, the basin drains over 8,000 square miles, Oregon's fourth largest drainage basin, and incorporates portions of eleven counties. Originating in the Strawberry Mountains near Prairie City, the John Day River flows 284 miles in a northwesterly direction, entering the Columbia River approximately four miles upstream of the John Day dam. With wild runs of spring Chinook salmon and summer steelhead, westslope cutthroat, and redband and bull trout, the John Day system is truly a basin with national significance.

The majority of the John Day basin was ceded to the Federal government in 1855 by the Confederated Tribes of the Warm Springs Reservation of Oregon (Tribes). In 1997, the Tribes established an office in the basin to coordinate restoration projects, monitoring, planning and other watershed activities on private and public lands. Once established, the John Day Basin Office (JDBO) formed a partnership with the Grant Soil and Water Conservation District (GSWCD), also located in the town of John Day, who contracts the majority of the construction implementation activities for these projects from the JDBO.

The GSWCD completes the landowner contact, preliminary planning, engineering design, permitting, construction contracting, and construction implementation phases of most projects. The JDBO completes the planning, grant solicitation/defense, environmental compliance, administrative contracting, monitoring, and reporting portion of the program. Most phases of project planning, implementation, and monitoring are coordinated with the private landowners and basin agencies, such as the Oregon Department of Fish and Wildlife and Oregon Water Resources Department.

In 2002, the JDBO and GSWCD proposed continuation of their successful partnership between the two agencies and basin landowners to implement an additional twelve (12) watershed conservation projects. The types of projects include off channel water developments, riparian fencing, juniper control, permanent diversions, pump stations, infiltration galleries and return-flow cooling systems.

Project costs in 2002 totaled $423,198.00 with a total amount of $345,752.00 (81%) provided by the Bonneville Power Administration (BPA) and the remainder coming from other sources such as the Bureau of Reclamation (BOR), Oregon Watershed Enhancement Board, the U.S. Fish & Wildlife Service Partners in Wildlife Program and individual landowners.

Figure 1. Upper John Day Basin Map

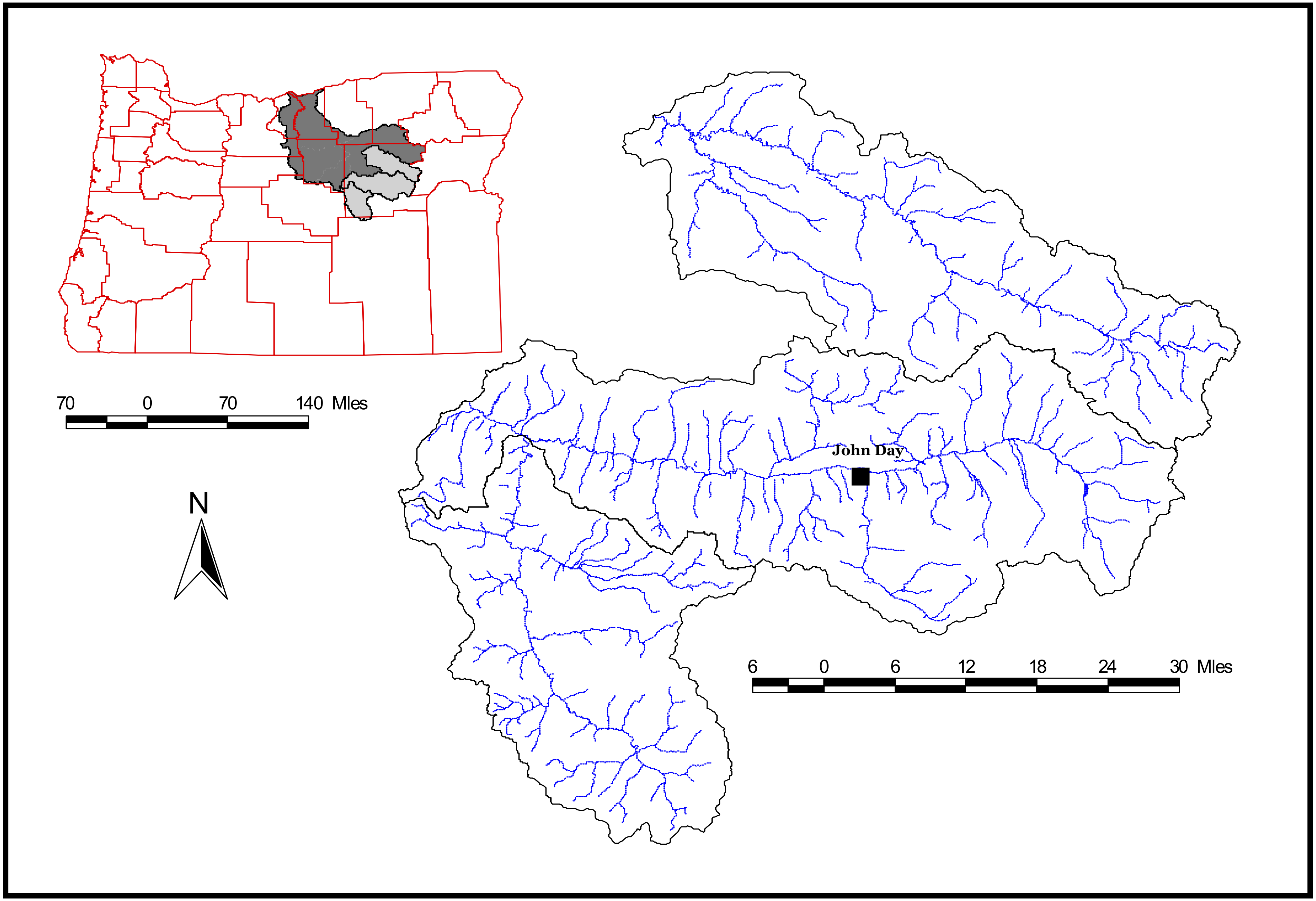


Figure 2. Upper Mainstem John Day River Project Location Map

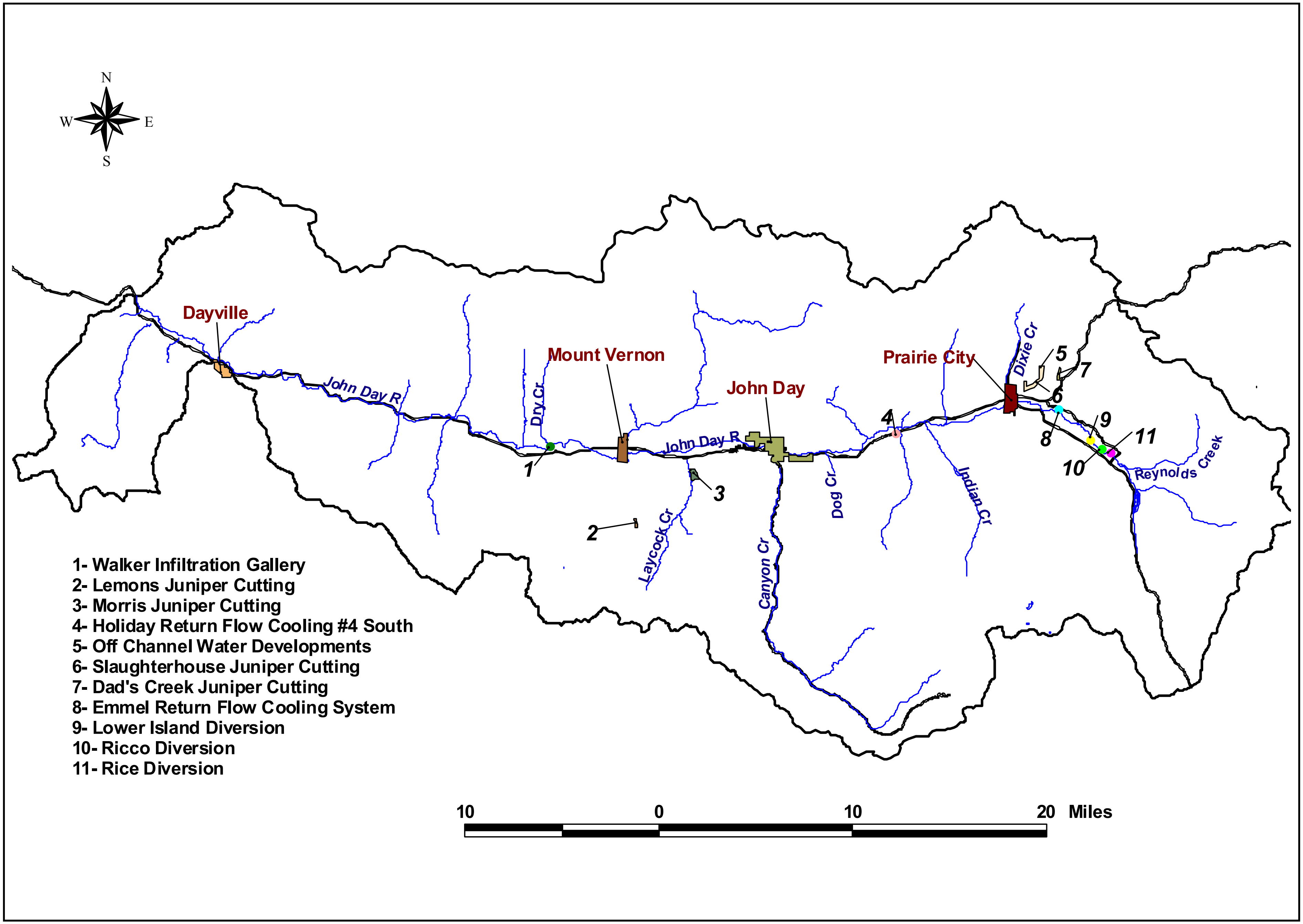
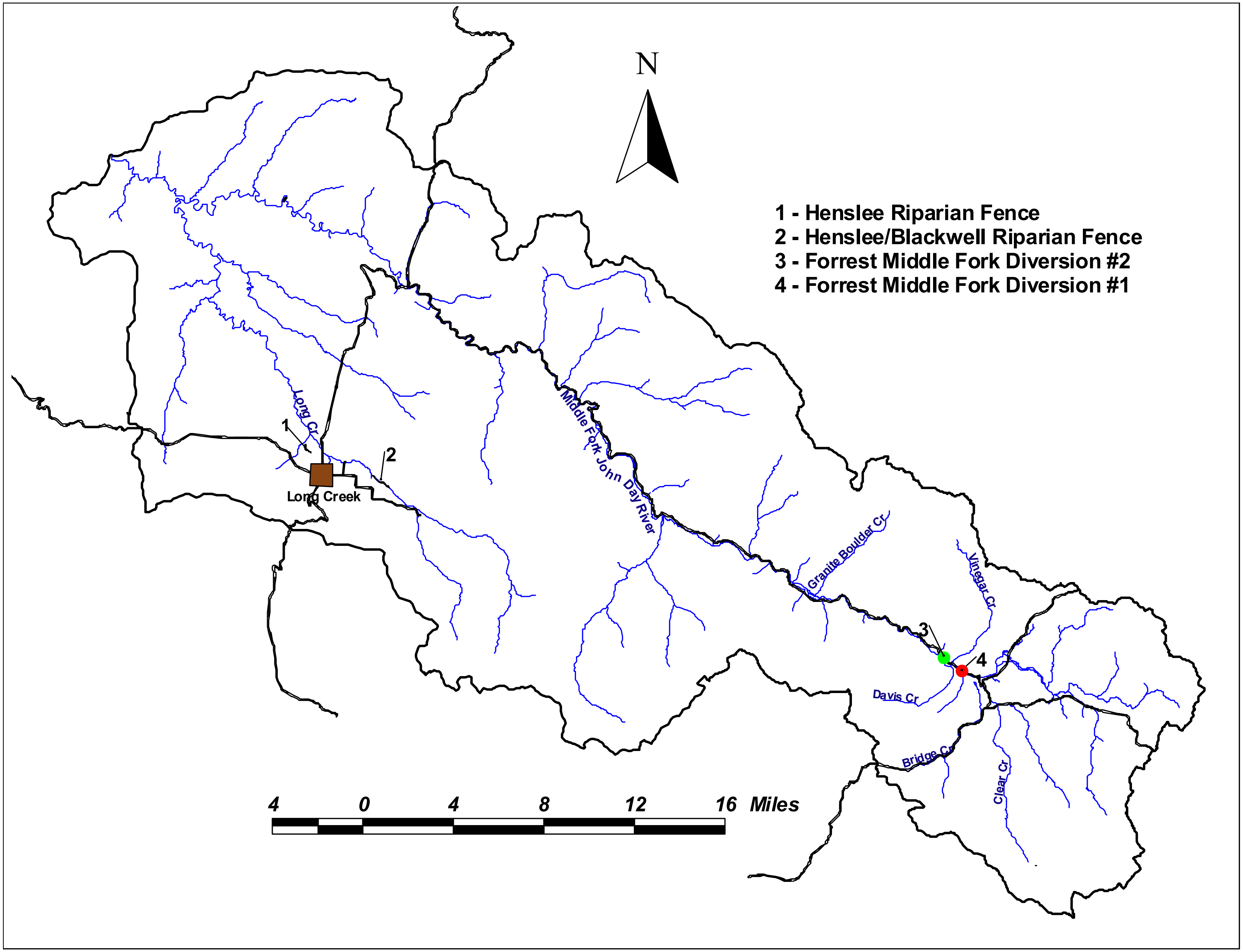


Figure 3. Middle Fork John Day River Project Location Map



Introduction

John Day Watershed Restoration is an on-going, interagency program that focuses primarily on converting inefficient, detrimental land-use practices through irrigation system upgrades, upland restoration and riparian fencing and planting. The program's objectives include removing fish passage impediments, increasing water flows, increasing water quality, and enhancing riparian and stream channel recovery. The program has received support from landowners and funding agencies alike, with a track record of over 60 successfully completed projects. Though benefits most readily apply to fish species, the cumulative effects apply to basin-wide watershed recovery.

Resource Issues

IRRIGATION DIVERSIONS

Historic practices involved finding some means by which to impound water and direct its flow into a ditch or open channel of some sort, which would then transport the water to the field needing irrigation. The landowners are limited to what resources, time, and expense they can expend on such irrigation water diversions. Thus landowners devised the temporary push-up diversion. These diversions are typically constructed by using heavy equipment, perhaps even a bulldozer, to push-up gravel and rocks from the streambed to form a miniature dam. These dams were often supplemented with sheets of plywood or metal, hay bales, or other large objects that could impound water and direct it into a conveyance channel (*see* Appendix 1, Photo 28. Typical gravel push-up diversion). Structurally, these types of diversions can be extremely inefficient due to their physical construction and site location.

These push-up diversions are also temporary in that they are not firmly secured in place, and so are prone to blowing out in high run-off events, and simply wearing away over the course of a season. Such diversions are routinely re-built every year, if not more often. These diversions may have represented a sort of quick-fix to the problem of getting water, water that the landowners may have had legal title to since before the turn of the century. The negative aspects of such methods are a) they involve repeated construction, and constant upkeep, and b) they do not take into account the need for fish passage, nor realize the cumulative impacts being made upon the channel bed and bank with each re-construction. These migratory barriers can become a problem at various times during the year as follows:

1) If stream flows are low in the spring and the push-up diversion is not "blown out"[1] or removed, a passage impediment can be created for adults migrating upstream to spawning areas.

2) When water temperatures in the mainstem and lower reaches of the tributaries cool in the fall, large numbers of rearing juveniles and stream resident adults outmigrate to overwintering areas. If diversions remain in place, they can become an impediment for outmigrants to move to more productive overwintering habitat areas.

3) If diversions are not blown out or removed in the spring prior to smolt outmigration they may become an impediment to smolt migration or entrain smolts.

[1] There is no requirement, and because of damage resulting from instream construction—little desire, to remove gravel push-up diversions following the irrigation season. However, if spring flows are insufficient to "blow out" the diversion, the structure often remains in place throughout the year.

4) As summer water temperatures compromise conditions in the mainstem and lower reaches of Rearing tributaries, juveniles and stream resident adults must migrate to areas of better water quality. If push-up diversions are installed prior to this migration (about the 1st of July) they can prohibit migration to upstream rearing areas.

In addition, whenever construction activities take place within the stream and along the banks, sediment load is increased, vegetation is impacted, and microhabitats are disturbed. The trend of the channel profile in such areas is toward wider, shallower channels. These indirectly lead to warmer waters and further streambank erosion.

Replacing these temporary, push-up diversions is a costly, intensive undertaking, however, and most landowners could not do it without some assistance. Fortunately, once assistance is provided, there are a variety of designs that can replace these structures, and may be tailored to fit the location and the landowner and resource's requirements. The types of systems that have been successfully installed within the John Day Basin, through partnerships with the CTWSRO, GSWCD, and North Fork Watershed Council include: permanent lay-flat diversions, pump stations, and infiltration galleries. The landowners that have participated in these projects have realized significant savings in water use and the amount of labor necessary to conduct otherwise arduous management practices. In addition, our monitoring efforts have documented significant riparian recovery and other improvements that will support increased salmonid populations within the basin.

Overland Return Flows

Flood irrigation is the most common type of irrigation within the John Day Basin. Though this method may be less labor-intensive than operating a sprinkler system, it has its own drawbacks. The amount of water delivered to the field is difficult to measure. Most systems were constructed many years ago, when water efficiency was not such a pressing issue. Miles of open conveyance ditches through which water must travel before reaching the field to be irrigated often characterize these systems. During this travel time, evaporation, seepage, and spill losses can be significant. Besides the fact that water may be difficult to measure when diverted through historical means, irrigators may divert more than the legal rate and duty just to move their entitlement through the ditch. Once water reaches the fields, it often ponds up in lower areas, decreasing the desired productivity of that area. This may push grazing pressure over to riparian areas, or encourage the landowner to farm more riparian acreage in exchange for lost hay ground.

On some lands that are flood irrigated, ditches or other systems collect tailwater from fields and return it to the river. Return flows may serve to degrade further, water quality impaired stream reaches. If water is returned through open conveyance systems, which are exposed to solar radiation, they can be thermally elevated and may increase river temperatures.

Riparian Grazing

Historical descriptions suggest the John Day River once supported dense growths of aspen, poplar, willow and cottonwood galleries, composing thick, wide riparian corridors. High quality river habitat represented optimum conditions for the production of large numbers of salmon, steelhead, and resident trout. Beaver were also common along the river.

Riparian areas are lands next to streams and rivers where vegetation is influenced by the presence of water and in return influences the quality of the water present. The significance of riparian areas is far greater than their small size suggests. Riparian areas are comprised of diverse habitats, supplying food, water, shade and shelter for fish, wildlife, livestock and humans. Diversity of vegetation is an important characteristic of riparian areas in good condition. Woody and herbaceous plants slow water velocities thusly reducing erosion and water sediment levels. Vegetation cover shields soil from solar heating reducing the temperature of soil and water reducing evaporation and water temperatures. These areas act as sponges by holding water and extending the length of the stream flow season.

Riparian areas are attractive areas both for the landowner to direct their cattle, and for the cattle to occupy due to the continual supply of water and shade. Other factors, such as inefficient irrigation that causes ponding and growth of unpalatable vegetation, can push cattle into riparian areas to graze. Ranchers may have to spend considerable time riding cows around to keep them moving away from the same riparian areas they frequent.

Improper livestock management, excessive grazing and trampling can affect riparian areas by reducing or eliminating riparian vegetation, causing channel degradation, widening or incising of stream channels, and lowering of water tables. These cumulative effects are all detrimental to water quality and therefore fish populations.

The deterioration of riparian areas in the western U.S. began with the sever overgrazing by livestock in the late 1800's and early 1900's. This past land mismanagement has important implications for today's management practices. The protection of healthy riparian areas and the restoration of degraded areas must remain a high priority.

Juniper Encroachment

The uplands of the John Day valley once supported vast expanses of tall, plentiful native bunchgrasses, and open-canopy sagebrush communities. Mining, grazing, timber harvest, and intensive agricultural practices all have worked to change this natural scenario within the past 120 years. These changes resulted in habitat destruction, fragmentation, and the expansion of noxious weeds. It has been estimated that less than one percent of the native shrub steppe habitat remains in the Columbia Plateau region of Oregon. Most of these areas, which include the associated woodlands, grasslands, and shrub lands, have been altered. The principle factors facilitating such changes have been water diversions, dry-land agricultural conversions and excessive grazing.

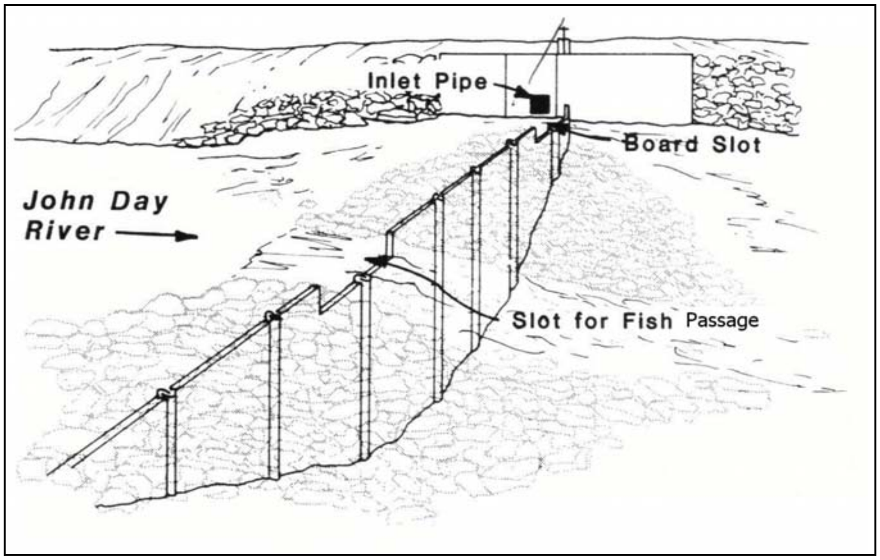
European settlement introduced changes that contributed to juniper expansion, including grazing and fire suppression. Grazing contributed to juniper expansion by decreasing vegetative competition, encouraging growth of shrubs that are safe sites for juniper seedlings to establishment. Fire suppression began with the decline of Native American populations in the U.S., who used fire to augment both their own and wildlife food supplies. Heavy livestock grazing, contributed to fire hazards by reducing grasses for fire fuel. These changes modified typical juniper dispersal from occasional trees scattered across open areas, or individuals existing on fire-retardant, rocky islands, to dense stands. The negative effects of dense juniper woodlands have build upon each other and include: intense nutrient and water competition; decreased soil infiltration; decreased plant diversity, especially native grass species; increased erosion; decreased wildlife habitat suitability and diversity.

Expansion of western juniper, once a controlled, native species, has altered much of the watershed function. Historic juniper distribution averaged one or two trees per acre. Today there may be 200 to 8,000 young junipers per acre. Currently, juniper and pinyon-juniper woodlands cover 24 million ha in the western United States. Though there is considerable controversy over the benefits and detriments of such expanded juniper ranges, data exists to show that the recent phenomenon of juniper expansion indicates declines in other ecosystem functions. Juniper woodlands have expanded into a variety of plant communities, including grassland, shrub steppe, aspen, ponderosa, and riparian communities.

As stated previously, many upland wildlife species depend on both upland and riparian habitats for water, food, and seasonal cover. In return, the status of the upland vegetation affects forage potential, wildlife cover, and sediment contribution to the water supply. The program supports an expansion of the Restoration program by addressing water supplies sequestered within dense juniper stands. Juniper removal treatments will mirror the Restoration Program objective to increase water flows and water quality. In evapotranspiration rate alone, one mature juniper can cycle up to 30 gallons of water a day. Where upland improvements such as juniper removal have occurred, sequestered water is released to flow freely and be of use to the native aquatic and terrestrial species.

Background on Project Types

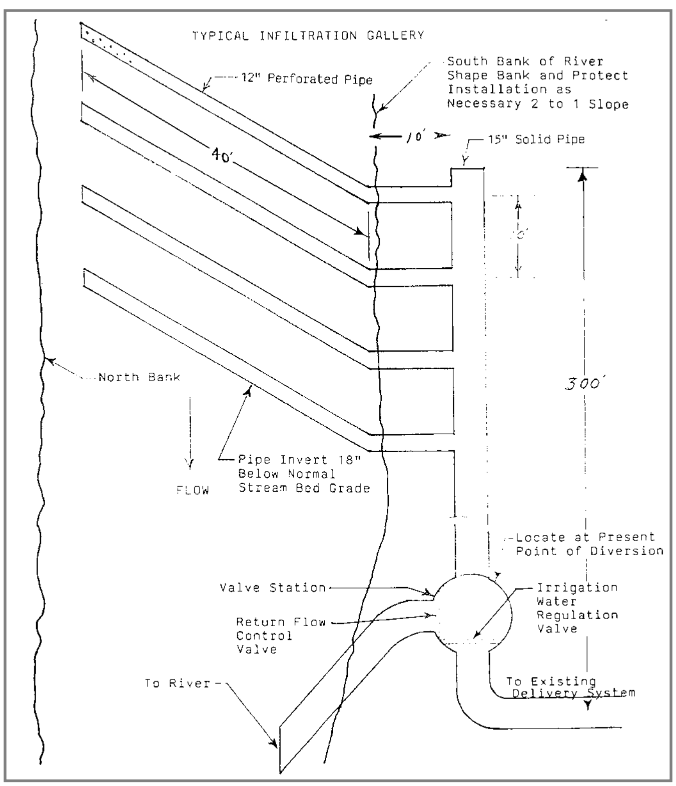
Permanent Diversions



The most inexpensive replacement for temporary push-up diversions is permanent lay-flat diversions. First, interlocking steel pilings are driven upright in the keyway until the tops are at the natural riverbed grade. A fishway is cut in the steel so that its bottom is at the grade of the spillway. The spillway is constructed using precast concrete sections set on grade and bolted together (to reduce forming and concrete placing in the water). The floor of the spillway is poured in the precasts and the lay-flat stanchions are welded onto weld plates. Splashboards can be placed against the braces to raise the water to improve diversion. Oftentimes a new head gate and water-measuring device is installed at the point of diversion. Any existing fish screen/wheel can usually be left in place to continue to screen fish from the ditch.

These structures ensure fish passage at all flows. The head gate is set at the level of the sill such that flashboards are not required for diversion until late in the year, compared with the push-up diversion of years past. The bottom of both the fishway and the spillway are set at the same elevation as the existing streambed. When flashboards are placed in the spillway, flow over the fishway is increased. The sheet piling seals the structure so that the water passes over the top. The turbidity of the water -–the measure of suspended materials –decreases. The costs for operation and maintenance are decreased substantially. The flashboards permit a more even diversion rate and help maintain a consistent flow. This establishes a controllable structure and provides consistent and accurate delivery of the water right.

Infiltration Galleries



Infiltration Galleries are constructed by installing well screen collectors just below the surface of the streambed. The collected water is transferred to the irrigation delivery system through conveyance pipe. The pipe system includes a flow control valve and riser, which allows control of diverted rates and also facilitates back flushing of the system in the event flows decrease due to riverbed sealing. IFGs have been incorporated into both gravity flood irrigation systems and pumped systems.

GSWCD - The Grant District has used Johnson Screens and specifications for determining transmitting capacities per foot of screen provided by the manufacturer (U.S. Filter, John Screens, Inc., St. Paul, MN). Stainless Steel screen is available in 2 to 36 inch iron pipe size with intake slot openings from 0.010 to 0.100 inches. Capacities are determined by multiplying 0.31 times the open area in square inches for the pipe size selected. At this capacity the entrance velocity is 0.1 ft. per second. The length of screen required for a particular site uses the hydraulic conductivity of local stream bed materials (K in gal/day/sq. ft.) incorporated into a formula developed by John Screens and found in *Groundwater and Wells*. The hydraulic conductivity is usually the limiting factor and defines the length of the collector system required. As the material varies from gravel to sand or finer the system length becomes uneconomical. The length of the required trench is inversely proportional to the hydraulic conductivity (also called coefficient of permeability) and the submergence of the screen (a sample spreadsheet used to evaluate conditions is available). As stated elsewhere in this response, silt or clay stream bottoms are not sites to install galleries, in our experience. Collectors are placed shallow. We place the crown of the screen approximately 4 inches below the existing streambed elevation. This has worked effectively. Screen buried deeper tends to seal over the top of the screen and require more frequent back flushing. Once size and length of the collector are determined, the appropriate control valve is selected. The control valve/back flush station is designed as well as the planned delivery system. Construction occurs during low flows between Jul. 15th and Aug.15 or 30th, depending on the site location within the Upper John Day Basin in accordance with the ODFW Recommended Instream Work Window. During construction stream flows are directed around the work area using temporary barriers where possible or temporary piping on the small sites. A trench is excavated two feet wide by 16 inches deep (for 12 in. screen) to receive the collector. The collector is installed in the trench and connected to the control station and delivery system. Excavated materials are used to cover the collector. Excess spoils are shaped over the disturbed are and the area is seeded, usually later in the fall. If the collector supplies an open ditch delivery system, a measuring device is installed so the system can be regulated to the legal rate of diverted. If the system supplies a pump, the pump is outlet is equipped with a totalizing flow meter.

Riparian Revegetation

Following construction activities at all sites where river banks have been disturbed either from historic practices or during the process of construction, the spoils are re-shaped and banks are planted with a variety of riparian vegetation to speed bank recovery. Plantings range from native grasses to cottonwood shoots. In this way, the issue of vegetation recovery is addressed at every project site. In addition, two separate nursery projects address the issue of re-planting riparian species along river channels, funding was directed to the Monument Nursery in 1999 and then to the Native Plants Nursery located on the Forrest Ranch on the mainstem John Day River in 2002. A Cottonwood Reserves Project, has also been completed during the 2002 contract year on the Forrest Ranch mainstem property. These projects are described in greater detail below.

Return Flow Cooling Systems

A project that does not address water use, but rather water returns, is the return-flow cooling projects. When fields are flood-irrigated, it is common for excess water to "pond up" in low spots on the field. These areas quickly become rank and useless for cultivating a crop. Therefore, the landowner will construct a ditch system that leads into a shallow ditch system, typically made of wood, to drain these low, wet spots of excess irrigation water. Though this design sends water back to the stream or river from which it was diverted, the water is subjected to intense thermal loading and nutrient collection as it travels back to the river. Upon entering the river, the waters pose a contribution of poor quality water. In addition, the wooden conveyance systems in place today were installed 50 or more years ago. Now they are rotting and leaking, loosing the water they were intended to carry.

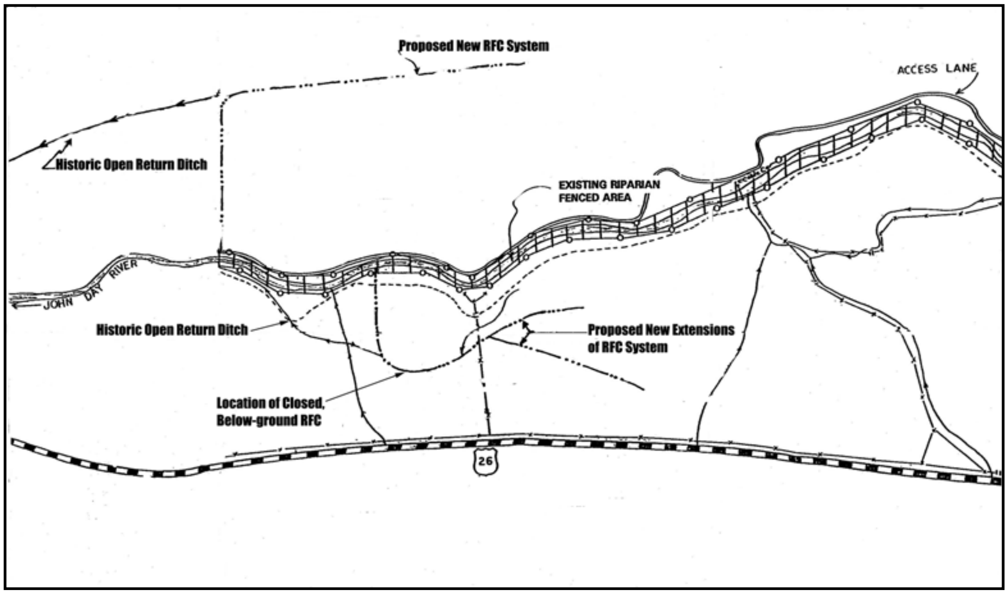


Figure 4. Typical Return Flow Cooling System Design

Water returning from irrigation usage to the stream channel heats due to solar radiation. Our solution has been the return-flow cooling (RFC) system. These involve replacing the existing wooden or dirt return ditches with continuous perforated pipe below ground from the low areas to the river. This will collect the ponded water and direct it underground, where it may cool by as much as 20 °F before entering the river. The point of outflow from the system may create thermal refugia for fish and other organisms that rely on cool waters for survival.

Riparian Corridor Fence

Riparian habitats require site-specific management. Fencing is the easiest way to obtain rapid improvement and immediate protection in riparian areas from cattle grazing. Riparian corridor fencing can maintain and assist in riparian recovery leading to increased woody and herbaceous plant abundance and overall watershed health.

Riparian corridor fencing removes the cattle pressure from the streambanks and beds. Usually, such fences are built to either include a watergap or some method of off-site watering source. Such fencing may promote dispersion of grazing pressure within the area. In addition, landowners view the fences favorably because it keeps the cows away from the water during calving season, preventing them from having calves near water in which they may drown before they are strong enough to move to safer locations. The riparian corridor benefits with decreased impacts, decreased erosion, increased vegetation recovery, shade, streambank stabilization, channel deepening and narrowing, increased microhabitats for aquatic organisms (including fish), and decreased stream temperatures.

OFF CHANNEL WATER DEVELOPMENTS

Off-site watering developments will create alternate water sources for cattle that otherwise would need river access, thus reducing the impact on the riparian area from cattle. These water developments are placed as to encourage more dispersed grazing and more even utilization of available forage.

Off site watering developments are typically spring-fed or draw water from a stream via a PVC pipeline. Site preparation includes any necessary ground leveling and installation of the trough foundation. When a spring is accessed and relative elevations allow, a collection system utilizing gravity-fed pressure is installed. If a stream is accessed, a solar pump may be used to supply water through a pipeline. Post-construction activities include system tests, shaping spoils, and seeding all disturbed areas. Projects are installed under cost-share agreements with landowners. Facility designs are site specific and the selected option much meet the “needed and feasible” criteria.

JUNIPER CONTROL

The program supports an expansion of the Restoration Program by addressing water supplies sequestered within dense juniper stands; juniper removal will mirror the Restoration Programs objective to increase water flows and water quality. The health of upland ecosystems is important to the health of the lower river systems, as the upland systems contribute water and sediment to rivers. The juniper removal program is based on the interrelationship of upland integrity and watershed health, as vegetation health on the uplands affects erosion and therefore water quality in the rivers. Upland wildlife species rely on the quality of riparian areas for seasonal food and shelter, and annual water.

This program targets 500+ acres per year for juniper removal where junipers have formed dense woodlands along drainages, streams, or around springs. Trees are reduced to maximum densities of 2 to 6 trees per acre. Tree carcasses lie where fallen unless they accumulate so that they cover the ground and prevent moisture and sunlight from reaching the seed sources below. The landowner is allowed to remove or burn the tree carcasses after five years. Treatment sites are surveyed for available native grass seed sources prior to juniper removal, and evaluated for potential water release. Photo points are established within each removal site, and yearly monitoring of plant species growth will be conducted, once pre-treatment, and for five years following removal treatments. Small areas of old growth juniper will be left intact as wildlife shelter areas. Adjacent drainages, streams, or springs will be observed for renewed flow following juniper removal. During 2002, 464 acres of juniper were treated for encroachment at 4 sites on tributaries to the mainstem John Day River.

Project Descriptions

PROJECT: FORREST MIDDLE FORK #1 DIVERSION

Photo 1. Pre-project photo of the Forrest Middle Fork # 1 Diversion site.

Project Background:
Irrigation water on the Forrest Conservation property historically has been diverted by a gravel and rock push-up diversion, which directed water through an open canal.

Project Objective:
Improve water quality and fish habitat and eliminate a fish passage barrier to anadromous and resident fish in the Middle Fork John Day River.

Photo 2. Forrest Middle Fork # 1 Diversion, Post-Construction

Project Description:
1. Input and analyze data collected under the 2001 monitoring plan for the project site.
2. Complete the engineering survey and design layout.
3. Replace annually installed push-up diversion with a permanent lay flat diversion.
4. Remove existing Corrugated Metal Pipe (CMP) and enlarge conveyance ditch to blend with down stream ditch.
5. Install a water use measuring device.
6. Utilize existing fish screen.
7. Rebuild fences removed or damaged during construction.
8. Plant grasses and hardwoods on both banks to increase rates of recovery.

Project Monitoring:
Monitoring Objective: Evaluate improvement in water quality and rate of channel and riparian recovery.

Monitoring Completed: Permanent photo point locations have been installed and pre- and post-project photographs have been taken. Stream flow data was recorded. Snorkel surveys were conducted prior to construction to determine number of juvenile salmonids present. Channel cross -sections were established. Stake row survival plots on planted riparian shrubs were installed to monitor plant survival. Thermal-loggers were installed near the project location to monitor water temperatures and water quality.

Project Cost:

Local Cost Share	2,911.00	(08%)
BPA Contribution	30,066.00	(92%)
TOTAL	$ 32,977.00	

Start Date: 15 July 2002 Completion Date: 15 August 2002

PROJECT: FORREST MIDDLE FORK # 2 DIVERSION

Photo 3. Pre-project photograph of Forrest Middle Fork Diversion #2

Project Background:
Irrigation water on the Forrest Conservation property historically has been diverted by a gravel and rock push-up diversion, which directed water through an open canal.

Project Objective:
Improve water quality and fish habitat and eliminate a fish passage barrier to anadromous and resident fish in the Middle Fork John Day River.

Photo 4. Forrest Middle Fork Diversion #2 Post Construction.

Project Description:

1. Input and analyze data collected under the 2001 monitoring plan for the project site.
2. Complete the engineering survey and design layout.
3. Replace annually installed push-up diversion with a permanent lay flat diversion.
4. Install PVC pipe to connect existing open irrigation conveyance system to new diversion.
5. Install a water use measuring device.
6. Use existing Fish Screen.
7. Rebuild fences removed or damaged during construction.
8. Plant grasses and hardwoods on both banks to increase rates of recovery.

Project Monitoring:
Monitoring Objective: Evaluate improvement in water quality and rate of channel and riparian recovery.

Monitoring Completed: Permanent photo points were installed and pre- and post-project photographs were taken. A permanent thermal-logger location has been established to monitor water temperatures in the area. Stream flows were recorded. Snorkel surveys where conducted prior to construction to determine number of juvenile salmonids present. Channel cross -sections were established. Stake row survival plots on planted riparian shrubs were installed to monitor plant survival.

Project Cost:

Local Cost Share	3,048.00	(08%)
BPA Contribution	31,430.00	(92%)
TOTAL	$ 34,478.00	

Start Date: 15 July 2002 Completion Date: 15 August 2002

PROJECT: RICE/ RICCO/ LOWER ISLAND DIVERSIONS

Photo 5. Rice diversion, pre-construction

Photo 6. Rice Diversion, post-construction.

Project Background: Historically the Vidondo/Ricco Ranch has diverted water for irrigation by the use of annually installed gravel and rock push-up dams many of which had old car bodies used to support the structures. This project involved the installation of a permanent lay-flat diversion to replace the temporary push-up diversion. Removing the push-up diversion allows unrestricted fish passage at all river levels, reduced sediment input, halts streambed/streambank degradation, and allows the aquatic and terrestrial system to recover. These projects are located east of Prairie City on the Mainstem John Day River within critical habitat for Chinook, steelhead and bull trout.

Project Objective: Improve water quality and fish habitat and eliminate a fish passage barrier to anadromous and resident fish in the John Day River.

Project Description:

1. Input and analyze data collected under the 2001 monitoring plan for the project site.
2. Complete the engineering survey and design layout.
3. Replace annually installed push-up diversion with a permanent lay-flat diversion.
4. Install new head gate.
5. Install measurement flume.
6. Install CMP to connect new diversion to existing conveyance system.
7. Install new fish screen.
8. Fill old ditch from old diversion site to allow for new diversion ditch.
9. Rebuild fences removed during construction.
10. Plant grasses and hardwoods on both banks to increase rates of recovery.

Project Monitoring:
Monitoring Objective: Evaluate improvement in water quality and rate of channel and riparian recovery.

Monitoring Completed: Permanent photo points were installed and pre- and post-project photographs were taken.

Project Cost: Rice

Local Cost Share	2,371.00	(08%)
BPA Contribution	24,703.00	(92%)
TOTAL	$ 27,074.00	

Start Date: 15 July 2002 **Completion Date:** 15 August 2002

Photo 7. Ricco diversion, pre-construction

Project Cost: Ricco

Local Cost Share	2,066.00	(09%)
BPA Contribution	21,675.00	(91%)
TOTAL	$ 23,741.00	

Start Date: 15 July 2002
Completion Date: 15 August 2002

Photo 8. Ricco Diversion, post-construction

Photo 9. Lower Island Diversion, pre-construction

Project Cost: Lower Island
Local Cost Share 2,210.00 (09%)

BPA Contribution 23,110.00 (91%)

TOTAL $25, 320.00

Start Date: 15 July 2002

Completion Date: 15 August 2002

Photo 10. Lower Island Diversion, post-construction

PROJECT: WALKER INFILTRATION GALLERY

Photo 11. Walker Diversion pre-construction

Project Background; Water for irrigation on at the Walker diversion site has historically employed the use of a temporary push-up diversion. To replace this diversion an infiltration gallery was installed at the site and connected to the existing mainline. The project is located near the city of Mt. Vernon on the Mainstem John Day River. Removing the push-up diversion allows unrestricted fish passage at all river levels, reduced sediment input, halts streambed/streambank degradation, and allows the aquatic and terrestrial system to recover.

Project Objective: Construct infiltration gallery to remove a fish passage impediment, potentially improving stream flows by removing an inefficient diversion structures.

Project Description:

1. Input and analyze data collected under the 2001 monitoring plan for the project site.
2. Complete the engineering survey and design layout.
3. Replace annually installed push-up diversion with infiltration gallery.
4. Install pressure pump and valve system.
5. Install PVC pipe to connect existing open irrigation conveyance system to new diversion process.
6. Install measuring device.
7. Rebuild fences removed during construction.
8. Plant grasses and hardwoods on bank to increase rates of recovery.

Photo 12. Walker Infiltration Gallery and pressure pump post-construction.

Project Monitoring:

Monitoring Objective: Evaluate improvement in water quality and rate of channel and riparian recovery. Evaluate Infiltration Gallery Impacts on macroinvertebrates in the project site.

Monitoring Completed: Permanent photo points were installed and pre- and post-project photographs were taken.

Project Cost:

Local Cost Share	1,573.00	(06%)
BPA Contribution	22,705.00	(94%)
TOTAL	$24,278.00	

Start Date: 15 July 2002

Completion Date: 15 August 2002

PROJECT: HOLLIDAY RETURN FLOW COOLING # 4 SOUTH

Project Background; Water returning from irrigation usage to the stream channel increases in temperature due to solar radiation. Our solution has been the return-flow cooling (RFC) system. The Holliday RFC #4S project area is located within migratory and rearing habitat for spring Chinook and steelhead and migratory and over-wintering habitat for bull trout and westslope cutthroat. The Return-flow Cooling #4S project replaced the open ditches with perforated PVC pipe. These pipes collect return flows below ground and transport the run-off to the river directly. Monitoring of similar projects has revealed a remarkable increase in water quality of return flows and improvements in localized water quality in the river water column following installation of such return-flow cooling systems.

Photo 13. Holliday Return Flow Cooling #4 South Post Installation.

Project Objective: Construct Return Flow Cooling System to improve water quality through decreased water temperatures. Improve spawning and rearing habitat for listed species.

Project Description:

1. Input and analyze data collected under the 2000 monitoring plan for the project site.
2. Complete the engineering survey and design layout.
3. Install buried perforated PVC pipe to replace existing open irrigation return system.
4. Rebuild fences removed during construction.

Project Monitoring:

Monitoring Objective: Evaluate improvement in water quality.

Monitoring Completed: Permanent photo points were installed and pre- and post-project photographs were taken. Thermal logger locations established at RFC outlet.

Project Cost:

Local Cost Share	7,765	(06%)
BPA Contribution	53,217.00	(94%)
TOTAL	$60,982.00	

Start Date: 1 May 2002 Completion Date: 1 July 2002

PROJECT: EMMEL RETURN FLOW COOLING

Photo 14. Emmel RFC Project pre-construction.

Project Background;
The Emmel RFC project area is located east of Prairie City within migratory and rearing habitat for spring Chinook and steelhead on the Mainstem John Day River. The Return-flow Cooling project replaced the open ditches with perforated PVC pipe. These pipes collect return flows below ground and transport the run-off to the river directly and reducing fecal contamination from feeding areas into the river.

Project Objective: Construct Return Flow Cooling System to improve water quality through deceased water temperatures. Improve spawning and rearing habitat for listed species.

Project Description:
1. Input and analyze data collected under the 2000 monitoring plan for the project site.
2. Complete the engineering survey and design layout.
3. Install buried perforated PVC pipe to replace existing open irrigation return system.
4. Rebuild fences removed during construction.

Project Monitoring:
Monitoring Objective: Evaluate improvement in water quality.

Monitoring Completed: Pre- and post-project photographs were taken.

Project Cost:

Local Cost Share	1,850.00	(02%)
BPA Contribution	73,758.00	(98%)
TOTAL	$75,608.00	

Start Date: November 2002 Completion Date: December 23, 2002

PROJECT: HENSLEE RIPARIAN FENCING

Project Background; The Henslee Riparian Fencing project incorporates property on three different ranches that is leased by a landowner that has displayed considerable cooperation and interest in restoration efforts. This project fences off sections of Long Creek on two of the ranches, and Shaw Creek on the main landowners ranch. Long Creek has good potential for recruitment of new growth from woody species. This creek runs along a plateau, the side of which creates a natural barrier to cattle access on that side of the creek. Shaw Creek, on the other hand, runs through an open field. The fence here will provide protection from cattle impact, supporting vegetation and channel recovery, and in turn will benefit the rancher by protecting calves from falling in the creek during their first few days. Shaw Creek runs into Paul Creek, which, along with Long Creek, offers habitat for summer steelhead and resident trout. All three creeks are tributaries of the Middle Fork John Day River. **Total miles of habitat protected was 4.5 at the three locations.**

Photo 17. Riparian Corridor on Blackwell property along Long Creek pre-construction.

Photo 15. Henslee Shaw Gulch pre construction.

Photo 16. Henslee Shaw Gulch post construction

Project Objective: Construct three riparian corridor fences to limit cattle access to the creek. Improve riparian rejuvenation through lowered impacts from cattle to the banks and riparian vegetation. Improve water quality through riparian improvement.

Project Description:

1. Input and analyze data collected under the 2000 monitoring plan for the project site.
2. Complete the design layout.
3. Construct 4-strand barbed wire fence to exclude Riparian area form grazing.
4. Install water developments to provide livestock water.

Project Monitoring:

Monitoring Objective: Evaluate improvement in water quality and rate of channel and riparian recovery.

Monitoring Completed: Permanent photo points were installed and pre- and post-project photographs were taken.

Project Cost:

Local Cost Share	752.00	(04%)
BPA Contribution	16,000.00	(96%)
TOTAL	$16,752.00	

Start Date: 18 June 2002 Completion Date: 15 August 2002

PROJECT: JUNIPER CONTROL FOR WATERSHED RESTORATION

Photo 18. Juniper encroachment in the John Day Basin.

Project Background; The Juniper Control program supports an expansion of the Restoration Program by addressing water supplies sequestered within dense juniper stands; juniper removal will mirror the Restoration Programs objective to increase water flows and water quality. The health of upland ecosystems is important to the health of the lower river systems, as the upland systems contribute water and sediment to rivers. The juniper removal program is based on the interrelationship of upland integrity and watershed health, as vegetation health on the uplands affects erosion and therefore water quality in the rivers. Upland wildlife species rely on the quality of riparian areas for seasonal food and shelter, and annual water.

This program targets 500+ acres per year for juniper removal where junipers have formed dense woodlands along drainages, streams, or around springs. **During the 2002 season 621 acres were cut well exceeding our goal.** Trees are reduced to maximum densities of 2 to 6 trees per acre. Tree carcasses lie where fallen unless they accumulate so that they cover the ground and prevent moisture and sunlight from reaching the seed sources below. The landowner is allowed to remove or burn the tree carcasses after five years. Treatment sites are surveyed for available native grass seed sources prior to juniper removal, and evaluated for potential water release. Photo points are established within each removal site, and yearly monitoring of plant species growth will be conducted, once pre-treatment, and for five years following removal treatments. Small areas of old growth juniper will be left intact as wildlife shelter areas. Adjacent drainages, streams, or springs will be observed for renewed flow following juniper removal.

Photo 19. Slaughterhouse Pre-Falling

Photo 20. Slaughterhouse Post- Falling

Project Objective: Release sequestered water from drainages and uplands suffering from extreme juniper encroachment. Improve base flows for spawning and rearing habitat. Improve upland and riparian condition.

Project Description:

1. Develop monitoring plan for the project site.
2. Complete site design and layout.
3. Installed permanent photo point locations.
4. Administer subcontracts to cut juniper.

Project Monitoring:

Monitoring Objective: Evaluate improvement in water flow rates in selected drainages after removal of dense juniper stands. Monitor rate of riparian and upland recovery.

Monitoring Completed: Permanent photo points were installed and pre- and post-project photographs were taken. Stream flows were recorded and measurement weirs installed on Dad's Creek and Slaughterhouse Gulch.

Project Cost:

Bonneville Power Administration	$25,000(62.5%)
Partners in Wildlife USFWS	$10,000(25%)
Local Landowners	$ 5,000(12.5%)
Total	$40,000

Start Date: 19 November 2002 Phase One - Completion Date: 1 March 2003

Ongoing Project

PROJECT: OFF CHANNEL WATER DEVELOPMENTS

Project Background; This program has been developed to encourage Riparian Fencing in pastures were cattle grazing is an annual event. With the installation of Off Channel water sources traditional "water gaps" are no longer necessary along the stream, eliminating bank damage and stream degradation in these areas.

These water developments are placed as to encourage more dispersed grazing and more even utilization of available forage. The upland developments supply a water source not only for livestock but for wildlife as well. Both solar and gravity feed systems are employed with each site designed for maximum efficiency and water supply. With the elimination of "water gaps" riparian recovery and aquatic habitat improvement is greatly increased. **During 2002 three sites were developed and an additional 4 sites located.** These sites will be developed following the spring rains for exact placement of the spring boxes.

Project Objective: Construct Off-Channel water developments in conjunction with riparian fencing projects to increase rates of riparian recovery. Eliminate need for water gaps in riparian corridor fences. Develop upland sources of water for wildlife and livestock use to encourage more even utilization and distribution on uplands.

Photo 22. Installation of Off-Channel water developments.

Project Description:

1. Develop monitoring plan for the project site.
2. Identify water development sites.
3. Complete site design and layout.
4. Installed permanent photo point locations.
5. Administer subcontracts to install developments.
6. Rebuild fences removed during construction.
7. Plant grasses to increase rates of recovery.

Project Monitoring:

Monitoring Objective: Evaluate improvement in water quality and rate of channel and riparian recovery in conjunction with Riparian Fencing projects.

Monitoring Completed: Permanent photo points were installed and pre- and post-project photographs were taken.

Project Cost:

Local Cost Share	1,000.00	(7%)
BPA Contribution	12,900.00	(93%)
TOTAL	$13,900.00	

Start Date: September 2002 Completion Date: December 2002

Ongoing Project

PROJECT: NATIVE PLANTS NURSERY

Project Background; The Monument has been the only local source available to provide plant materials used in agency restoration programs. The nursery is well established in the basin with sufficient land, water, and labor to increase the nature and extent of available materials. However the current cost of some materials prohibits widespread use for conservation purposes. In 1999 alone, the Monument Nursery distributed approximately 4000 units of riparian plants. The establishment of a Native Plants Nursery on the Forrest Mitigation Property mainstem site will increase access to native plants for riparian planting and restoration projects on both the Middle Fork John Day and mainstem John Day Rivers. With the addition of this location, costs for native plants can be kept to a minimum and diversity of plant species can be maximized, encouraging additional riparian restoration projects. The Forrest Conservation Property Nursery has been planted with cottonwood and several species of willow from various locations throughout the basin, mock orange from the South Fork John Day River and big sagebrush for upland restoration efforts. Plans are to include Mountain Mahogany and Bitterbrush in plantings this fall. The nursery is currently home for more than 800 shrubs and trees. The nursery is also being used as a demonstration model for solar pumping and irrigation.

Project Objective: Develop a Native Plants Nursery to supply materials to riparian restoration projects.

Project Description:

1. Complete the location survey, cultural survey and design layout.
2. Purchase materials for fencing, weed control and irrigation.
3. Prepare Nursery site for planting.
4. Install fencing weed cloth and irrigation system.
5. Collect and plant cuttings and other plant materials.
6. Maintain nursery, monitor plant growth and development; determine proper time for transplanting to restoration sites.

Photo 23. Planted Cuttings along the Middle Fork John Day River

Photo 24. Young trees Planted in the Native Plants Nursery at the Forrest Mainstem Property.

Project Monitoring:

Monitoring Objective: Evaluate improvement in water quality and rate of channel and riparian recovery from planting of riparian plants.

Monitoring Completed: Permanent photo points were installed and pre- and post-project photographs were taken. Stake row survival transects installed on Forrest and Oxbow Mitigation Properties.

Project Cost:

Local Cost Share	1,500.00	(38%)
BPA Contribution	2,500.00	(62%)
TOTAL	$ 4,000.00	

Start Date: January 2002 Completion Date: December 2002

PROJECT: 2002 MONITORING EFFORT

Project Background: A consensus water quality-monitoring plan is being prepared for the John Day basin. In the interim, an annual plan is prepared which includes evaluations of completed, proposed, and planned restoration projects. Evaluating completed projects is critical to assessing the biological benefits of the project as well as for effective planning of future activities.

The monitoring program evaluates projects at varying levels. While each project is evaluated and monitored to a certain extent, some projects or project types receive a greater level of monitoring dependent upon factors such as level of activity, expected biological response, resource issues proposed to be addressed by the project, and representative nature of project to other project types. For example, a return flow cooling project may be monitored for water temperatures, while a permanent diversion may be monitored for riparian vegetation and stream channel condition.
At a minimum, each proposed project has a permanent photo point installed, pre- and post-project photo points taken, and a GPS location marked on the GIS project location map. In addition, a representative sample of projects are monitored as follows:

1. Permanent diversions (and pump station projects) may be monitored for channel structure, riparian vegetation, and fish passage.
2. Return flow cooling projects may be monitored for water temperatures and river thermal profile.
3. Infiltration galleries are being monitored for water temperature, flow improvement, and effects on aquatic populations including macroinvertebrates.
4. Other projects are monitored according to resource objectives and information needs.

Project Objective: Improve assessments of completed projects and evaluate to a sufficient level in order to assist with future planning efforts.

Project Description:

1. Amend or revise the 2002 annual monitoring plan to incorporate future and current projects as necessary.
2. Implement the monitoring plan.
3. Prepare annual monitoring and individual project monitoring assessment reports.

Project Monitoring:

Monitoring Objective: Varies by project and can be accessed through the matrix of pathways located in the Bull Trout and Steelhead Biological Assessments for the US Fish and Wildlife Service and NOAA Fisheries. Starting in 2003 a separate monitoring report will be submitted as a supplement to the Watershed Restoration Program Annual report.

Monitoring Completed:

1. Permanent photo points were installed and pre- and post-project photographs were taken at the proposed project locations and permanent transect locations.
2. Stream flows were recorded at selected project sites and gauging stations within the John Day Basin and data compared with historic records.
3. A mark-recapture study was conducted to evaluate gross movement patterns and passage over diversion structures at the locations on the Forrest Ranch and Oxbow Ranch Mitigation Properties.

4. Macroinvertebrates were collected and samples were classified for further reference and population estimates.
5. Return Flow project sites were monitored for temperature and thermal profile.
6. ESA pre-project assessments were completed for 2003 project sites.
7. Stream flows were monitored in streams associated with juniper cutting projects, for determination of flow increases from juniper removal.
8. Stake row survey plots were installed to monitor survival rates on hardwood cuttings planted along the Middle Fork John Day River.
9. Permanent avian census plots were established on the Forrest and Oxbow Mitigation Properties and spring bird counts were taken.
10. Forty seven (47) thermal loggers were installed throughout the basin to evaluate stream temperatures, included in these were the 2002 project construction sites.

Project Cost:			
	Local Cost Share	4,500.00	(50%)
	BPA Contribution	4,588.00	(50%)
	TOTAL	$9,088.00	

Start Date: June 2002 Completion Date: December 2002

Photo 25. Permanent Transect along the Middle Fork John Day River.

Appendix 1

TYPICAL PERMANENT DIVERSION INSTALLATION PHOTOS

Photo 28. Typical gravel push-up diversion

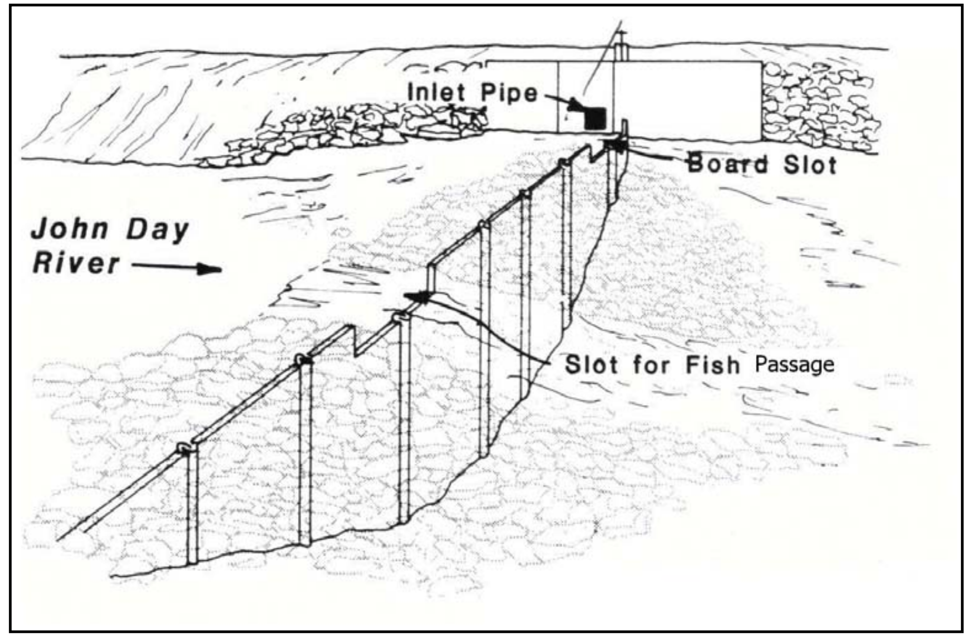


Figure 5. Typical permanent diversion design drawing

Photo 26. Installation of Pre-cast Sill Boxes

Photo 27. Filling Pre-cast Sill Boxes

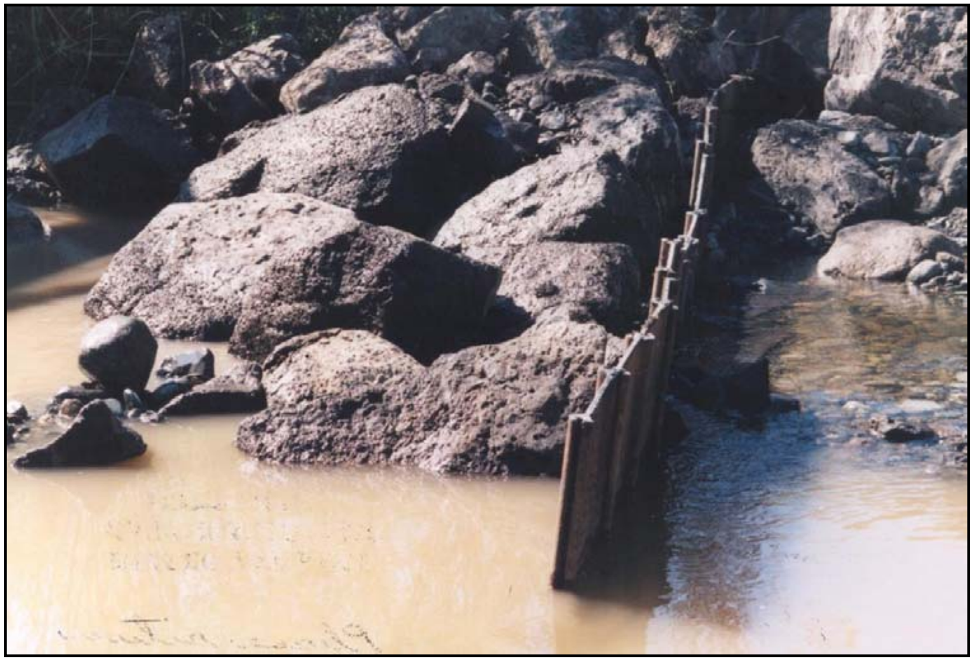


Photo 29. Installation of sheet steel piling

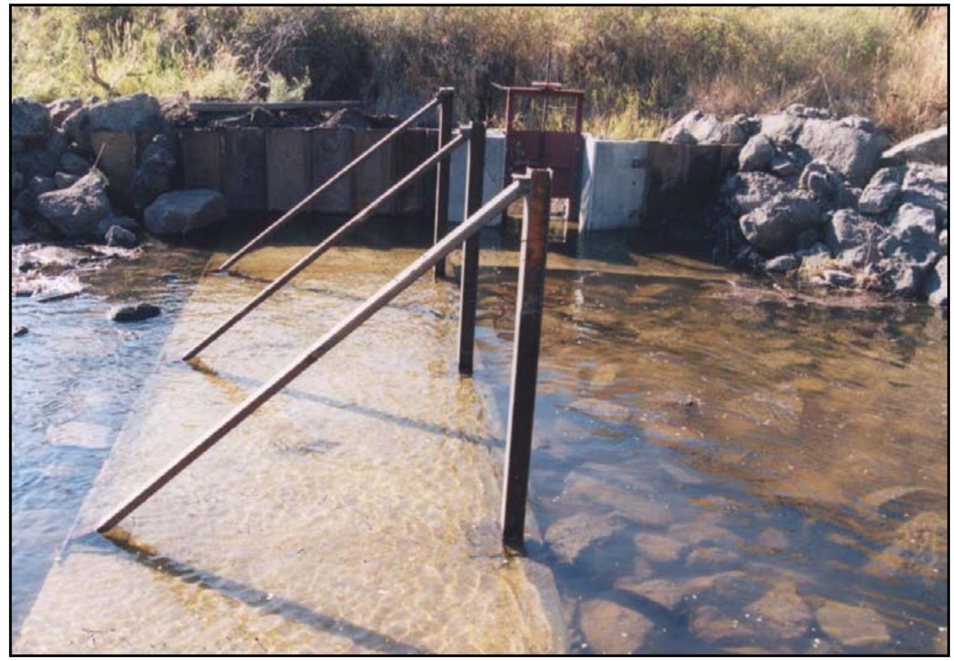


Photo 32. Typical permanent diversion, lay flat stanchions up, no flashboards

Photo 31. Typical permanent diversion with flashboards installed

Photo 30. Typical permanent diversion, flashboards not installed

Photo 34. Typical permanent diversion, flashboards installed

Photo 33. Typical permanent diversion, flashboards not installed

Appendix 2

TYPICAL INFILTRATION GALLERY INSTALLATION PHOTOS AND PLANS

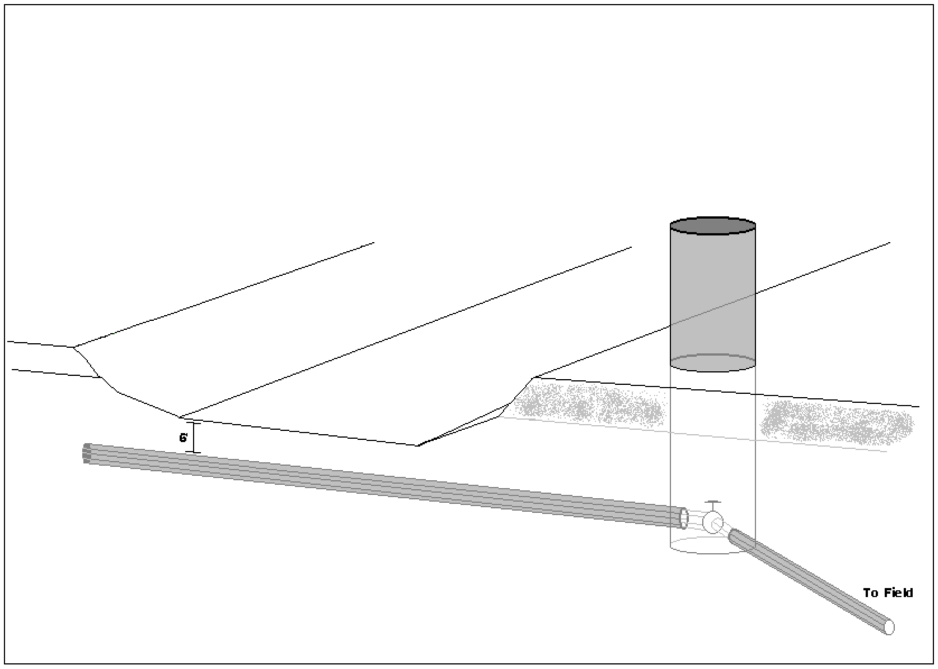


Figure 6. Typical Infiltration Gallery Profile.

Figure 7. Typical Infiltration Gallery Design Plans.

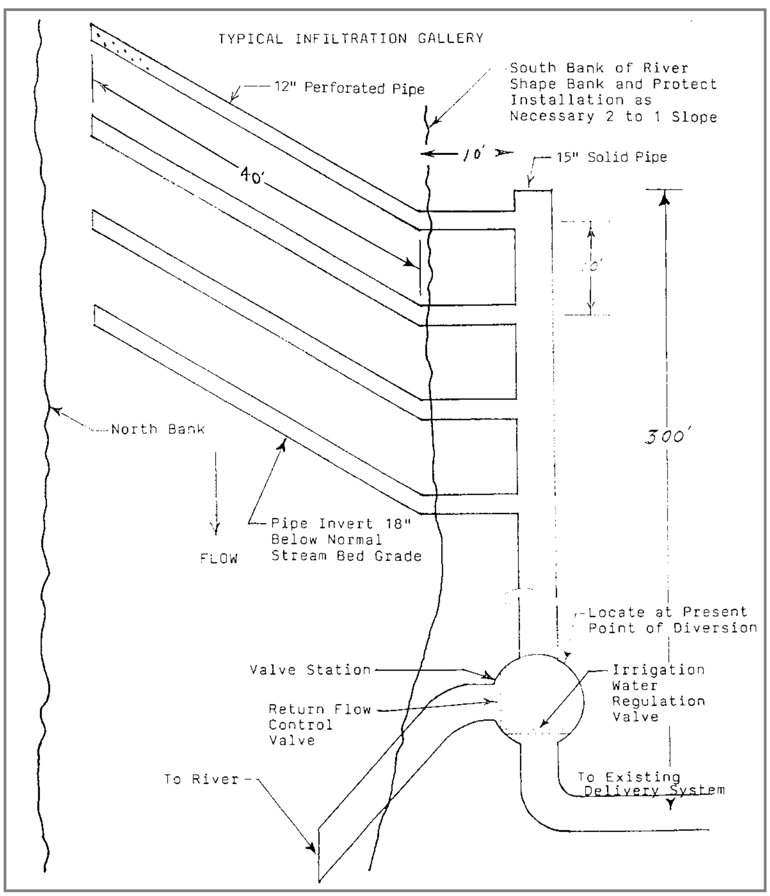


Photo 35. Well Screen Collectors in streambed

Photo 36. Infiltration Gallery conveyance system

Photo 37. Conveyance system connected to well screen

Photo 39. Well screen collectors with streambed rock replaced.

Photo 38. Completed Infiltration Galley location.

Appendix 3

TYPICAL RETURN FLOW COOLING INSTALLATION PHOTOS AND PLANS

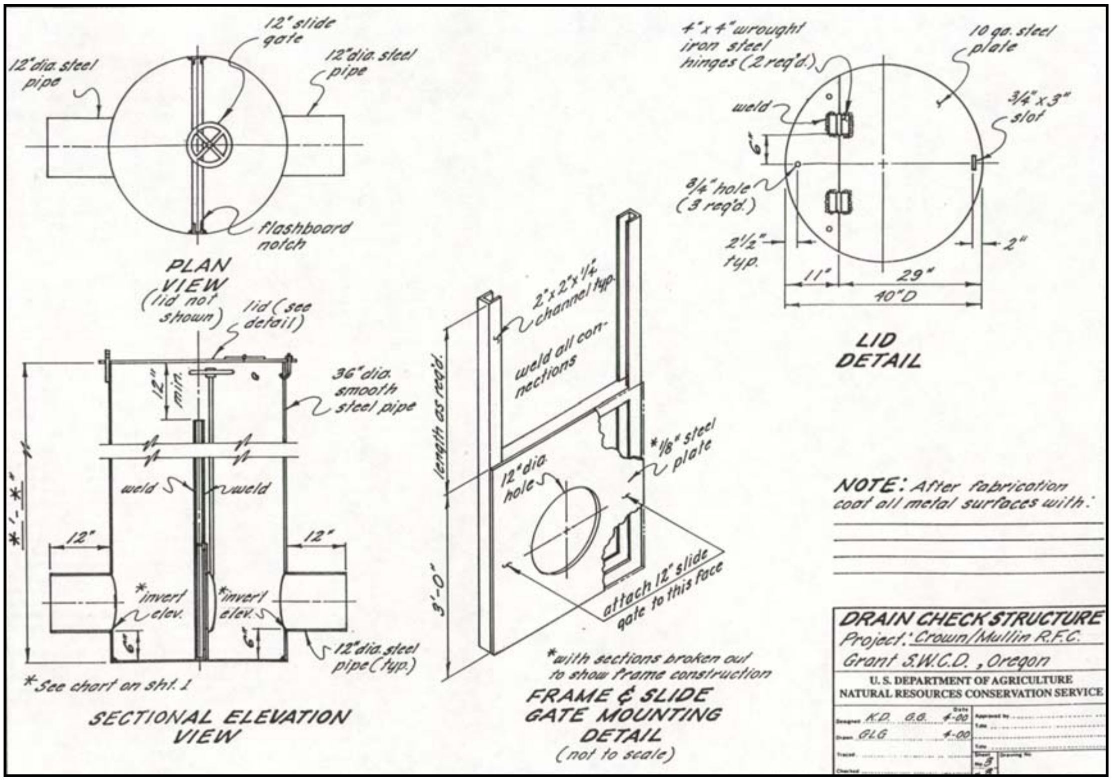


Figure 8. Return Flow Cooling System drains and chimney.

Figure 9. Typical RFC design plans.

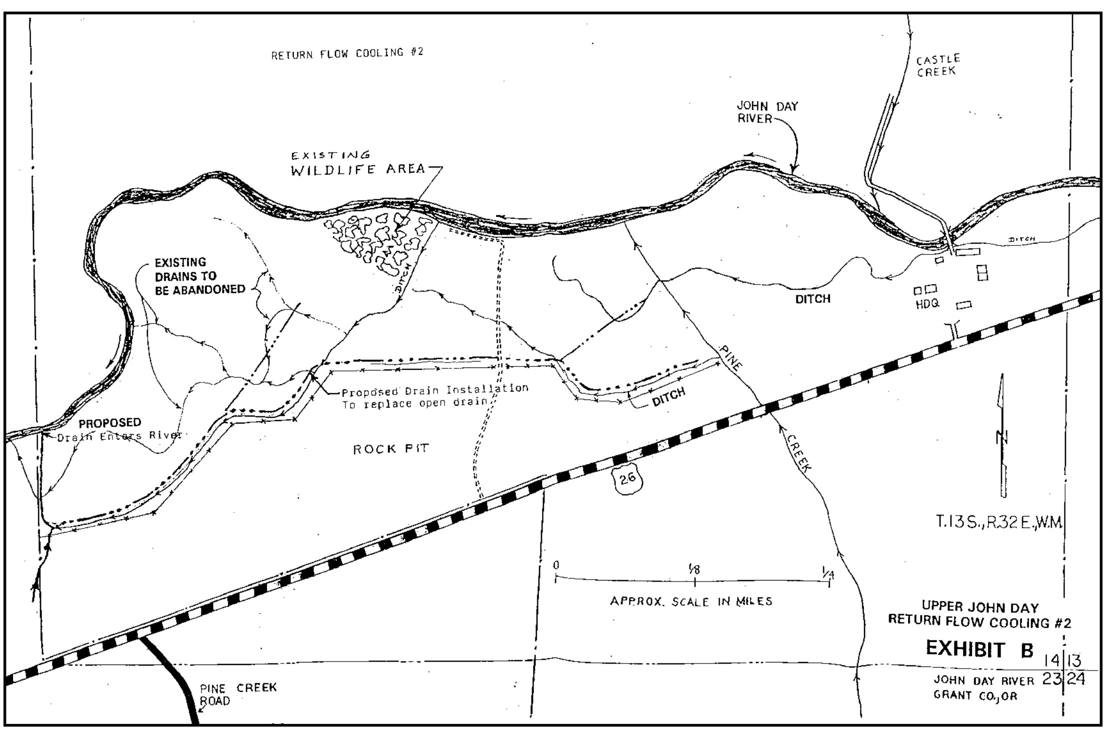


Photo 40. Irrigated field prior to RFC installation.

Photo 41. Installation of RFC.

Photo 42. Field immediately following RFC installation

Photo 43. RFC location following vegetation regrowth.

Photo 44. RFC Drain Chimneys

Photo 45. RFC river outlets.